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IS 8768 (2000): Method of Measurement of Colour in Liquid Chemical Products Platinum-cobalt Scale [CHD 1: Inorganic Chemicals]



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भारतीय मानक
द्रव रसायनिक पदार्थों का प्लेटिनम-कोबाल्ट
माप पर रंग मापने की विधि
(दूसरा पुनरीक्षण)
Indian Standard

METHOD OF MEASUREMENT OF COLOUR IN
LIQUID CHEMICAL PRODUCTS
PLATINUM-COBALT SCALE
(*Second Revision*)

ICS 71.040.50

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Chemical Standards Sectional Committee had been approved by the Chemical Division Council.

This standard was first issued in 1978. The standard was revised in 1988 when in order to rectify some of the operational difficulties, the scope of the standard, colour comparator, standard Hazen matching solution and the procedure for measurement were modified. The revision also included two new tables namely, Table 2 Platinum-cobalt colour standard for light colours and Table 3 Absorbance tolerance limits for platinum-cobalt stock solution (500 Hazen colour units).

The standard is being further revised to correct the nomenclature in line with ASTM D 1209-93 Standard test method for colour of clear liquids (platinum-cobalt scale). As per this method, the parts per million nomenclature (Hazen units) is not used since colour is not referred directly to a weight relationship. The term APHA colour is primarily for water and hence the same is not suitable for colour of liquid chemical products. Therefore, the recommended nomenclature for referring to the colour of liquid chemical products is 'platinum-cobalt colour' which has been now specified. There exists ISO 2211:1973 on liquid chemical products — Measurements of colour in Hazen units (platinum-cobalt scale) earlier of which are not identical to this standard.

The standard is intended to achieve uniformity and avoid unnecessary variations in details of the method of determination of colour in platinum-cobalt scale colour units given in different Indian Standards dealing with liquid chemical products.

The composition of the technical committee responsible for the formulation of this standard is given in Annex A.

In reporting the results of a test or analysis made in accordance with the standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values(*revised*)'.

Indian Standard

METHOD OF MEASUREMENT OF COLOUR IN LIQUID CHEMICAL PRODUCTS PLATINUM-COBALT SCALE

(Second Revision)

1 SCOPE

1.1 This standard prescribes the method of measuring colour of clear liquid chemical products in platinum-cobalt scale units.

1.1.1 The method is applicable to liquids in which colour producing bodies present have light absorption characteristics nearly identical with those of platinum-cobalt unit colour standard.

2 REFERENCES

The Indian Standards listed below contains provisions which through reference in this text, constitute provisions of this Indian Standard. At the time of publication, the edition indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

<i>IS No.</i>	<i>Title</i>
265 : 1993	Hydrochloric acid (<i>fourth revision</i>)
1070 : 1992	Reagent grade water (<i>third revision</i>)

3 TERMINOLOGY

3.0 For the purpose of this standard, the following definitions shall apply.

3.1 Platinum-Cobalt Scale Units

The colour of a solution containing 1 mg/l of platinum in the form of chloroplatinic acid in the presence of 2 mg/l of cobalt chloride hexahydrate.

3.2 Colour

The term colour here means true colour, that is, colour due to substance in solution. If there is suspended matter, it should be removed by filtration/centrifuging.

4 QUALITY OF REAGENTS

4.1 Unless specified otherwise, pure chemicals and reagent grade water (*see* IS 1070) shall be used in the tests.

NOTE — 'Pure Chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

5 OUTLINE OF THE METHOD

Colour is determined by visual comparison of the sample with colour standards and the result expressed in terms of platinum-cobalt scale.

6 APPARATUS

6.1 Colour Comparison Tubes — matched 100 ml, tall form Nessler tubes, provided with ground-on optically clear, glass caps. Tubes should be selected so that the height of 100 ml graduation mark is 275 mm to 295 mm above the bottom of the tube.

6.2 Colour Comparator — constructed so as to permit visual comparison of light transmitted through tall form Nessler tubes when viewed along the longitudinal axis. This permits reflection of light off a white glass plate which is directed with equal intensity through both the cylinders. The instrument is shielded so that no light enters the cylinders from the sides.

6.3 Spectrophotometer — equipped for liquid samples and for measurements in the visible region.

6.4 Spectrophotometer Cells — matched cells having 10 mm light path.

7 REAGENTS

7.1 Cobalt Chloride Hexahydrate — ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$).

7.2 Hydrochloric Acid — specific gravity 1.19 (*see* IS 265).

7.3 Chloroplatinic Acid (H_2PtCl_6) or Potassium Chloroplatinate — (K_2PtCl_6).

Dissolve 1.000 g of platinum in sufficient quantity of aqua regia in a glass or porcelain dish by heating on boiling water bath. When the metal has dissolved, evaporate the solution to dryness. Add 4 ml of hydrochloric acid and again evaporate to dryness. Repeat this operation thrice. In this way, 2.10 g of chloroplatinic acid is obtained.

7.4 Platinum-Cobalt Reference Standards

7.4.1 Platinum-Cobalt Stock Solution

Dissolve 1.00 g of cobalt chloride and the equivalent of 0.5 000 g of platinum (1.50 g of chloroplatinic acid or 1.245 g of potassium chloroplatinate) in water in a 1 000-ml volumetric flask, add 100 ml of hydrochloric acid, dilute to the mark and mix. This solution has a colour of 500 platinum-cobalt scale units.

7.4.2 Standard Platinum-Cobalt Scale Matching Solutions

Into two series of ten 500-ml and fourteen 250-ml volumetric flasks, place the volumes of platinum-cobalt stock solution (*see 7.4.1*) shown in Table 1, dilute to the mark and mix. For more precise measurement of light colours below 15 platinum-cobalt units, prepare colour standard from stock solution in accordance with Table 2. Use semi-micro burette for measuring the required amount of stock solution.

NOTE — Platinum-cobalt reference standard of 500 units shall have absorbance in the range as given in Table 3 with the reagent grade water in the matched cell as reference solution.

Table 1 Platinum-Cobalt Colour Standards
(Clause 7.4.2)

Sl No	500-ml Volumetric Flask		250-ml Volumetric Flask	
	Volume of Platinum-Cobalt Stock Solution, ml	Corresponding Colour Platinum-Cobalt Units	Volume of Platinum-Cobalt Stock Solution, ml	Corresponding Colour Platinum-Cobalt Units
i)	0	0	30	60
ii)	5	5	35	70
iii)	10	10	40	80
iv)	15	15	45	90
v)	20	20	50	100
vi)	25	25	62.5	125
vii)	30	30	75	150
viii)	35	35	87.5	175
ix)	40	40	100	200
x)	50	50	125	250
xi)	—	—	150	300
xii)	—	—	175	350
xiii)	—	—	200	400
xiv)	—	—	225	450

7.4.3 Storage of Standard Solution

The platinum-cobalt stock solution and the standard platinum-cobalt matching solutions (*see 7.4.1* and *7.4.2*) should be stored in the dark in stoppered glass bottles. Under these conditions, the colour of platinum-cobalt stock solution is stable for one year. The standard platinum-cobalt matching solution, although stable for at least one month, should preferably be prepared fresh.

Table 2 Platinum-Cobalt Colour Standards For Very Light Colours
(Clause 7.4.2)

Sl No.	Colour Standard Unit Platinum-Cobalt Scale	Stock Solution For 250 ml Flask, ml	Stock Solution For 500 ml Flask, ml
i)	1	0.5	1.0
ii)	2	1.0	2.0
iii)	3	1.5	3.0
iv)	4	2.0	4.0
v)	5	2.5	5.0
vi)	6	3.0	6.0
vii)	7	3.5	7.0
viii)	8	4.0	8.0
ix)	9	4.5	9.0
x)	10	5.0	10.0
xi)	11	5.5	11.0
xii)	12	6.0	12.0
xiii)	13	6.5	13.0
xiv)	14	7.0	14.0
xv)	15	7.5	15.0

Table 3 Absorbance Tolerance Limits For 500 Platinum-Cobalt Stock Solution (500 Platinum-Cobalt Scale Colour Units)
(Clause 7.4.2)

Sl No.	Wave Length, mm	Absorbance
i)	433	0.110 to 0.120
ii)	455	0.130 to 0.145
iii)	480	0.105 to 0.120
iv)	510	0.055 to 0.065

8 PROCEDURE

8.1 First check visually that the sample has colour characteristics close to those of the standard platinum-cobalt colour matching solution; if not, follow the instructions given in **9.2**.

8.2 Filter/centrifuge the sample if visible turbidity/suspended matter is noticed.

8.3 Pour into one of the Nessler tubes a quantity of the clear liquid sample sufficient to fill to the graduation mark. Similarly, pour the standard platinum-cobalt colour matching solution, which appears to have similar intensity of colour, into the other Nessler tube up to the mark. Place the two tubes in a comparator and compare the colour. Repeat, if necessary with other standard platinum-cobalt colour matching solutions until the closest match is obtained.

8.3.1 While comparing the colour of the sample with that of standard by looking down the tubes from top to bottom, against a white background strongly illuminated by day light or an electric 'day light' lamp, take care to avoid any side illumination.

NOTES

1 For routine control purpose, a colorimeter or spectrophotometer may be used. The instrument being

standardized by means of the standard colorimetric solution (see 7.4.1 and 7.4.2) provided that it has been confirmed that the use of that instrument gives the same results as does the visual comparison.

2 Instruments are available which permit usual comparison of liquid, of given depth, with a moving tinted glass disc corresponding to different standard platinum-cobalt colour matching solution.

3 The spectrophotometer used must be in proper operating condition and should be calibrated before use.

9 REPORTING

9.1 Express the colour of the sample as the number of platinum-cobalt colour units corresponding to the standard platinum-cobalt colour matching solution having the closest match to the sample and report as follows:

- a) Less than 5: Report less than 5 platinum-cobalt scale units

- b) 5 to 100: Report to the nearest 5 platinum-cobalt scale units
- c) 101 to 250: Report to the nearest 10 platinum-cobalt scale units
- d) 251 to 500: Report to the nearest 20 platinum-cobalt scale units

9.1.1 While reporting the colour units of a sample, that number should be reported which matches the specimen more closely. In the event of the colour lying midway between two standards, report the darker of the two. Otherwise, express the colour units as mentioned in the clauses.

9.2 If the colour of the sample does not correspond with that of any of the standard solution prescribed in 7.4.2 (brownish-yellow), report the approximate colour and describe it as 'off hue'.

ANNEX A

COMMITTEE COMPOSITION

(Foreword)

Composition of Chemical Standards Sectional Committee, CHD 1

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